

REMARKS

Favorable reconsideration of this application is respectfully requested in view of the amendments above and the following remarks. By virtue of the amendment, claims 7-11, 13-20, 26-29 and 31-41 are pending in the present application of which claims 7, 13 and 26 are independent. Claims 33-41 are newly added.

Claims 7-9, 11, and 32 were rejected under 35 U.S.C. § 102(b) as being anticipated by DiMaria et al. (4,939,559). Claim 12 was rejected under 35 U.S.C. § 103(a) as being unpatentable over DiMaria et al. in view of Kojima (5,644,528). Claims 26-30 were rejected under 35 U.S.C. § 103(a) as being unpatentable over DiMaria et al. in view of Simpson (6,362,504). Claim 31 was rejected under 35 U.S.C. § 103(a) as being unpatentable over DiMaria et al. and Simpson as applied to claim 26 and further in view of Kojima. Claims 13-16 and 20 were rejected under 35 U.S.C. § 103(a) as being unpatentable over DiMaria et al. in view of Noguchi (6,005,270). Claim 17 was rejected under 35 U.S.C. § 103(a) as being unpatentable over DiMaria et al. and Noguchi as applied to claim 13 and further in view of Kojima. Claims 18 and 19 were rejected under 35 U.S.C. § 103(a) as being unpatentable over DiMaria et al. and Noguchi as applied to claim 13 and further in view of Ngo (6,420,752). Claim 32 was objected to because of minor informalities. The above rejections are respectfully traversed for at least the reasons set forth below.

Drawings and Information Disclosure Statement

At the outset, the indication that the drawings and Information Disclosure Statement filed on August 23, 2001 have been respectively accepted and considered is noted with appreciation.

Claim Objections

Claim 32 was objected to because of minor informalities. Claim 32 included a typographical error. Claim 32 has been amended to correct this error. Therefore, the Examiner is respectfully requested to withdraw the objection of claim 32.

Claim Rejection Under 35 U.S.C. §102

The test for determining if a reference anticipates a claim, for purposes of a rejection under 35 U.S.C. § 102, is whether the reference discloses all the elements of the claimed combination, or the mechanical equivalents thereof functioning in substantially the same way to produce substantially the same results. As noted by the Court of Appeals for the Federal Circuit in *Lindemann Maschinenfabrick GmbH v. American Hoist and Derrick Co.*, 221 USPQ 481, 485 (Fed. Cir. 1984), in evaluating the sufficiency of an anticipation rejection under 35 U.S.C. § 102, the Court stated:

Anticipation requires the presence in a single prior art reference disclosure of each and every element of the claimed invention, arranged as in the claim.

Therefore, if the cited reference does not disclose each and every element of the claimed invention, then the cited reference fails to anticipate the claimed invention and, thus, the claimed invention is distinguishable over the cited reference.

Claims 7-9, 11, and 32 were rejected under 35 U.S.C. § 102(b) as being anticipated by DiMaria et al. This rejection is respectfully traversed because the claimed invention as set forth in amended claim 7 and the claims that depend therefrom are patentably distinguishable over DiMaria et al.

DiMaria et al. discloses a memory device having dual electron injectors, and an “off-stoichiometry” insulator, i.e. a silicon-rich, silicon dioxide (SiO_2) insulator between the injectors. The insulator layer between the injectors is rendered conductive during deposition through the addition of an excess of silicon or metallic specie. The resulting conductive insulator provides a means for draining off trapped charge in the insulator resulting in a device capable of from 10^8 to greater than 10^{10} write-erase cycles before threshold collapse occurs. See Abstract.

According to an embodiment of the invention, a thin film transistor memory device or cell is fabricated using low temperature oxides on inexpensive glass or plastic substrates. Low temperature oxides are used because of the low melt temperature of the glass or plastic substrate. The memory cells include a floating gate separated from a gate electrode portion of a gate line by an insulator formed from the low temperature oxide. The gate electrode portion includes a diffuse conductor that diffuses through the insulator under the application of write voltage to form a conductive path, CP, through the insulator that couples the gate line to the floating gate. The floating gate is adapted to act as a diffusion barrier to prevent the diffused metal from the gate electrode from diffusing into the gate insulator layer below the floating gate. See Abstract; Page 1, Lines 17-22; and Page 5, Line 33 – Page 6, Line 10.

Claim 7 as amended recites “a diffused metal path connecting the diffusive metal gate electrode to the at least one floating gate.” The Applicants submit that DiMaria et al. fails to teach the diffused metal path recited in claim 7. The arrows in insulator 5 of DiMaria et al. extending between electron injectors 1 and 3 in figures 1 illustrate the injection of electrons from the injectors 1 and 3. These arrows do not designate a diffused metal path.

Accordingly, DiMaria et al. fails to teach all of the features contained in claim 7, and thus, this claim is believed to be allowable. Claims 8-11 and 32 depend upon allowable claim 7 and are also allowable at least by virtue of their dependencies.

Claim Rejection Under 35 U.S.C. §103

The test for determining if a claim is rendered obvious by one or more references for purposes of a rejection under 35 U.S.C. § 103 is set forth in MPEP § 706.02(j):

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure. *In re Vaack*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Therefore, if the above-identified criteria are not met, then the cited reference(s) fails to render obvious the claimed invention and, thus, the claimed invention is distinguishable over the cited reference(s).

Claim 12 was rejected under 35 U.S.C. § 103(a) as being unpatentable over DiMaria et al. in view of Kojima. This rejection is now moot as claim 12 has been canceled.

Claims 26-30 were rejected under 35 U.S.C. § 103(a) as being unpatentable over DiMaria et al. in view of Simpson. This rejection is respectfully traversed because DiMaria et al. and Simpson, considered singly or in combination, fail to teach or suggest the claimed invention as set forth in amended claim 26 and its dependents.

DiMaria et al. discloses a memory device having dual electron injectors, and an “off-stoichiometry” insulator, i.e. a silicon-rich, silicon dioxide (SiO_2) insulator between the injectors. The insulator layer between the injectors is rendered conductive during deposition through the addition of an excess of silicon or metallic specie. The resulting conductive insulator provides a means for draining off trapped charge in the insulator resulting in a device capable of from 10^8 to greater than 10^{10} write-erase cycles before threshold collapse occurs. See Abstract.

Claim 26 as amended recites “a diffused metal path within the gate insulator and connecting the diffusive metal gate electrode to the at least one floating gate.” The Official Action asserts that DiMaria et al discloses all the elements of claim 26 except for the use of a low temperature oxide for the gate oxide. However, the Applicants submit that DiMaria et al. fails to teach or suggest the diffused metal path recited in claim 26. As stated previously, the arrows in insulator 5 of DiMaria et al. extending between electron injectors 1 and 3 in figures 1 illustrate the injection of electrons from the injectors 1 and 3. These arrows do not designate a diffused metal path.

Furthermore, the Applicants submit that Simpson also fails to teach or suggest a diffused metal path of claim 26. Simpson discloses a contoured nonvolatile memory cell. The memory cell is programmed and erased “using hot electron injection, also known as Channel Hot Electron (CHE) injection, or Fowler Nordhiem (FN) tunneling.” See column 3, lines 59-63. These methods transfer a charge via mobile electrons to a floating gate and do not create a diffused metal path. Therefore, Simpson also fails to teach or suggest a diffused metal path of claim 26.

At least by virtue of DiMaria et al.'s and Simpson's failure to teach or suggest the above identified element of claim 26, a *prima facie* case of obviousness has not been established under 35 U.S.C. § 103. Accordingly, the Examiner is respectfully requested to withdraw the rejection of claim 26. Claims 27-29 and 31 depend from allowable claim 26 and are also allowable over DiMaria et al. in view of Simpson at least by virtue of their dependencies.

Claim 31 was rejected under 35 U.S.C. § 103(a) as being unpatentable over DiMaria et al. and Simpson as applied to claim 26 and further in view of Kojima. The Applicants submit that claim 26 is not obvious over DiMaria et al. in view of Simpson. Therefore, claim 31 which depends from claim 26 is allowable at least by virtue of its dependency. The Examiner is therefore respectfully requested to withdraw the rejection of claim 31.

Claims 13-16 and 20 were rejected under 35 U.S.C. § 103(a) as being unpatentable over DiMaria et al. in view of Noguchi. This rejection is respectfully traversed because DiMaria et al. and Noguchi, considered singly or in combination, fail to teach or suggest the claimed invention as set forth in amended claim 13 and its dependents.

DiMaria et al. discloses a memory device having dual electron injectors, and an "off-stoichiometry" insulator, i.e. a silicon-rich, silicon dioxide (SiO₂) insulator between the injectors. The insulator layer between the injectors is rendered conductive during deposition through the addition of an excess of silicon or metallic specie. The resulting conductive insulator provides a means for draining off trapped charge in the insulator resulting in a device capable of from 10⁸ to greater than 10¹⁰ write-erase cycles before threshold collapse occurs. See Abstract.

Claim 13 as amended recites “a diffused metal path connecting the diffusive metal gate electrode to the at least one floating gate.” The Official Action asserts that DiMaria et al discloses all the elements of claim 13 except for the plurality of memory cells and the substrate made of glass or plastic. However, the Applicants submit that DiMaria et al. fails to teach or suggest the diffused metal path recited in claim 13. As stated previously, the arrows in insulator 5 of DiMaria et al. extending between electron injectors 1 and 3 in figures 1 illustrate the injection of electrons from the injectors 1 and 3. These arrows do not designate a diffused metal path.

Furthermore, the Applicants submit that Naguchi also fails to teach or suggest a diffused metal path of claim 13. Naguchi discloses a semiconductor nonvolatile memory device and a method of producing the memory device. The memory device includes a charge storage layer. This layer functions to hold a charge of migrated electrons and thus store value. See column 4, lines 1-6 and 21-31. Again, as in Simpson above, this charge transfer method does not create a diffused metal path. Therefore, Simpson also fails to teach or suggest a diffused metal path of claim 13.

At least by virtue of DiMaria et al.’s and Naguchi’s failure to teach or suggest the above identified element of claim 13, a *prima facie* case of obviousness has not been established under 35 U.S.C. § 103. Accordingly, the Examiner is respectfully requested to withdraw the rejection of claim 13. Claims 14-20 depend from allowable claim 13 and are also allowable over DiMaria et al. in view of Naguchi at least by virtue of their dependencies.

Claim 17 was rejected under 35 U.S.C. § 103(a) as being unpatentable over DiMaria et al. and Noguchi as applied to claim 13 and further in view of Kojima. The Applicants submit that claim 13 is not obvious over DiMaria et al. in view of Noguchi. Therefore, claim

17 which depends from claim 13 is allowable at least by virtue of its dependency. The Examiner is therefore respectfully requested to withdraw the rejection of claim 17.

Claims 18 and 19 were rejected under 35 U.S.C. § 103(a) as being unpatentable over DiMaria et al. and Noguchi as applied to claim 13 and further in view of Ngo. The Applicants submit that claim 13 is not obvious over DiMaria et al. in view of Noguchi. Therefore, claims 18 and 19 which depend from claim 13 are allowable at least by virtue of their dependencies. The Examiner is therefore respectfully requested to withdraw the rejection of claims 18 and 19.

Newly Added Claims

Claims 33-41 have been added. Claims 33-35 depend upon independent claim 7, claims 36-38 depend upon independent claim 13 and claims 39-41 depend upon independent claim 26. Claims 33-41 are allowable at least by virtue of their dependencies on their respective independent claims. Therefore, the Examiner is respectfully requested to allow claims 33-41.

Additionally, claims 33, 36 and 39 recite “wherein the diffused metal path is formed by the diffusion of conductive elements from the diffusive metal gate electrode through the gate insulator in response to a write voltage applied to the diffusive metal gate electrode.” The Applicants submit that DiMaria, Noguchi and Simpson, considered singly or in combination, fail to teach or suggest this feature. Therefore, the Examiner is respectfully requested to allow claims 33, 36 and 39.

Claims 34, 37 and 40 recite “wherein the diffused metal path is broken by the diffusion of conductive elements towards the diffusive metal gate electrode in response to a

reversal of the write voltage applied to the diffusive metal gate electrode.” The Applicants submit that DiMaria, Noguchi and Simpson, considered singly or in combination, fail to teach or suggest this feature. Therefore, the Examiner is respectfully requested to allow claims 34, 37 and 40.

Claims 35, 38 and 41 recite “wherein the at least one floating gate is adapted to prevent the conductive elements from the diffusive metal gate electrode from diffusing into the second gate insulator layer.” The Applicants submit that DiMaria, Noguchi and Simpson, considered singly or in combination, fail to teach or suggest this feature. Therefore, the Examiner is respectfully requested to allow claims 35, 38 and 41.

PATENT

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Conclusion

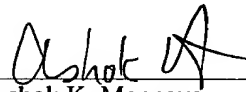
In light of the foregoing, withdrawal of the rejections of record and allowance of this application are earnestly solicited.

Should the Examiner believe that a telephone conference with the undersigned would assist in resolving any issues pertaining to the allowability of the above-identified application, please contact the undersigned at the telephone number listed below. Please grant any required extensions of time and charge any fees due in connection with this request to deposit account no. 08-2025.

Respectfully submitted,

Ping MEI et al.

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